The particularities of the calculation and of the cost reduction in lignite production

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Abstract: *In the market economy, the entities are, in an objective way, obliged to be preoccupied with the reduction of costs, taking into consideration the relationship of independence and indirect proportionality between the level of production costs and profit. The laws of competition oblige to the limitation of the waste channels, to the introduction of performant tehnological and tehnical solutions, to the systematic development of the work productivity. Because of this, we appreciated that is advisable that also in the extraction of lignite, we should determine a correct production cost, according to which should be possible the identification of the cost optimization possibilities. On the other hand, the effective cost of the lignite has a major importance because it represents the price which is registered in the accountancy, and, at the same time, through its size, concreted in stocks, it influences the total of the circulant actives and the net active, and the financial result of the exercise. These aspects can be arguments for the option of approaching this work's theme, in which there are analised the following problems: the general structure and the particularities of the production cost in lignite extraction and the directions for the minimization of the effective production cost, including for the applying of the standard-cost method.*

Ket words: lignite stocks, production costs, actual cost, standard cost, cost reduction.

1. Introduction

The extraction of the lignite is a complex process which implies a unusual concentration of financial, material and human resources, and also a specific organisation of the activity, determined by the particularities of this sector.

The exploatation of the lignite conists in emptying an impressive sterile volum and depositing it in warehouses, after which is realised the extraction of the mining mass, using the adequate machines. The principal operations which are being used in a lignite mine aim for a

specific succesion which influences the production cost: a. The preliminary emptying. b. The principal emptying. c. The excavation in coal or sterile coal. d. Transporting the mined sterile and coal. e. Depositating the sterile coal. f. Depositating the lignite. G. The concassasion of the lignite for devilery to the lignite beneficiars.

This essential operation, which we could name production phases, are mandatory for the extraction of the lignite and they atract costs with the implicated inputs and they influence the structure and the size of the cost afferent to the normal lignite. In this sense, it is justified to be mentioned other aspects regarding the organisation and the general development of the production activity, considering that they allow a better perception over the problems afferent to the cost calculation.

The exploatation of the energetic coal from the mines is realised with modern tehnologies, using high capacity machines: excavators with medium capacity rotor, excavators with low capacity rotor, halding machines, high capacity transporters with a lenght of cca. 320 km. This means 110 actions, depositing and extracting machines.

Each mile has a production headquaters which coordinates and supervises the production activity. At the level of SNL Oltenia and the component units, is being utilised an unitary informational system (ORACLE), through which the whole productive activity is being monitorised.

All of the high capacity extraction machines are eletrical. Their power supply is made from 15 transforming stations of 110/20 Kw. Anually, SNL Oltenia uses electrica power equivalent to 60% of Gorj County power consumption.

The activity of every entity of this types presumes human, material and financial resources consumption. The consumption of the input is being made in variable cantitative and qualitive proportions, and for the determination of the outcome the evaluation of this consumption is necesary.

2. THE GENERAL STRUCTURE AND THE PARTICULARITIES OF THE PRODUCTION COST OF LIGNITE EXTRACTION

The input consumption generates the production costs. These inputs contribute in different proportions and in different periods of time to the formation of the production costs, executed works, provided services.

In accountancy, the fixed assets consumption is gradually included, according to their wear, in the form of amortization costs.

The working assets are being transformed, becoming part of the new product (raw materials and a part of the auxiliary materials), or being consumed in the production process (energy, fuels, etc) and become costs with their whole value, because they are consumed in one single production cycle.

The production cost represents all of the expenses afferent to the input consumption which is being realized by the entity for the production and selling the material goods and, on this basis, their measurement and comparison becomes possible. From this definition results the follwing:

- the production cost is the cash form of the consumptions of materials and human inputs (both in material goods production and in services)

- the production costs includes everything that is an expense (input consumption) reported by the producers both for the good production and for their salesement.

- the production cost is the cash form of the expenses, regardless of their size and importance, which allow bringing to a common denominator the costs of the different inputs, and on this basis their measurement and comparison becomes possible[1].

The production cost is a fundamental factor in the success or failure of a company. On him depends the size of the company's activity and especially the profit's size[2].

The expenses which form the production and selling cost can be classified according to many criteria, thus, offering the possibility of grouping them in regard of the assessement of production cost, parallel with the definition of the places and people responsible with their evolution.

So, in **terms of their place of making**, the expenses are grouped like this:

- base activity expenses;
- auxiliary activity expenses;
- the expenses shared by all the departments;
- the general administration expense;
- selling expenses.

The classification of the expenses on primary elements is grouping the input consumption in the cost structure, according to their economic nature, like thus:

- MATERIAL EXPENSES, TOTAL, FROM WHICH
    - raw materials, base and auxiliary materials (from outside)
    - recoverable wastes (this are being substracted)
    - fuels, energy, water (from outside)
    - works and services provided by third parties
    - other material expenses
- EXPENSES WITH THE LIVING WORK, TOTAL, from which:
    - Expenses with the employees and other similar rights
    - Insurances and social protection
    - Other expenses with the living work

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[1] Dobrota N. and colectiv – Political Economy, ASB, Economic Edition, Bucharest , 1995

[2] Rusu C. and collective – Analysis and reglation of the company through costs, Gh. Assachi Edition, Iasi, 1995

This structuring of the costs on primary expenses elements is used by SNL Oltenia and its subordinate units.

The classification of the production costs **on calculation articles** (which present the destination of the expenses) assures the calculation of the unitary cost:

The structure of the production costs, in a minimal form is presented below:

- raw materials and direct materials;
- recoverable wastes;
- direct salaries;
- contributions regarding the salaries and other staff rights;

All of this are THE TOTAL OF DIRECT COST, at which we add:

- expenses with maintenance and functioning of the machines;
- general expenses of the department

Thus we obtain the DEPARTMENT COST, which by adding:

- the general expenses of the company they permit

the determination of the FACTORY COST. At this cost we add:

- selling expenses;

and we obtain the COMPLET COMMERCIAL COST.

At SNL Oltenia level, the structure of the costs on calculation articles, adapted to the necessities and specific of the lignite extraction activity are presented is presented below:

- raw materials and direct auxiliary materials;
- the amortization of the imobilities;
- capital reparations;
- direct salaries;
- contributions regarding the salaries;
- emptying;
- uncovering the reserves;
- other special services.

The recalled consumptions are THE DIRECT EXPENSES, which by adding:

- expenses with the maintenance and the function of the machines and
- the shared expenses of the department

permit the obtaining of the DEPARTMENT COST, at which we add the general administration expenses and we obtain the FACTORY COST, in which are included the sales expenses and thus we obtain the COMPLETE COMMERCIAL COST.

3. THE CALCULATION OF THE EFFECTIVE COST AND THE EVIDENCE PRICE AFFERENT TO THE LIGNITE PRODUCTION

Regarding the approach of the said theme, we mention that we have in mind the effective data from the Mining Exploatation (M.E.) Rosia, which has in each organizational structure, two lignite exploitation mines, namely: Rosia and Pesteana. The Pesteana Mine is located at a distance of 15 Km from the headquaters of M.E. Rosia and develops the following base activities:

- extraction of the lignite and sterile:
  - North Pesteana sector;
  - South Pesteana sector
- Auxiliary activities:

- Mechanic department
- Electric department
- Drainings Department
- Administrational Office

- Depositing the lignite: Cocoreni Warehouse

To exemplify the evaluation method of the lignite production we will present the existing situation at Pesteana Mine.

The existing lignite stock from the Cocoreni (Sf) Warehouse and the made deliveries from this warehouse (L) are being determined decadal. On the other hand, the initial stock is known from the beginning of the month (Si) which permits to be determined the **realized physic production** (Pf) in the first decade, exprimed in tons, according to the formula:

$$Pf = Pliv + L - Si$$

The same way we do for the second and third decades. At the end of the month, we add the physical production obtained in each decade and thus we obtain the physical production realized in that month.

The measurements are realized by the staff of the GEO-TOPO office, according to the specific procedure, and they make out the situation of the stocks and a protocol which contains the quantities established when measuring, which are confirmed by the administrator.

The physic production, determined according to the presented methodology, is compared with the obtained and transported production, according to the Informative Note, emitted by the headquarters, according to the daily reports on each excavator.

The effective situation of the lignite stocks and the physical production obtained at the end of the month and during it, is transmitted to M.E> Rosia, from each of the two mines, where is determined the value of the **realized merchandise production value**:

$$PM = Pliv + Sf - Si$$

where:

PM = the value of the realized merchandise production
Pliv = the value of the lignite deliveries towards the beneficiaries
Si = the value of the initial stock
Sf = the value of the final stock.

\Thus, it is assessed that the production obtained in January is being registered in the accountancy at the price of 56,02 lei/ton.

We remark the fact that at the Pesteana Mine, in fact this is the same with all of SNL Oltenia's subunits, **the extracted lignite is registered at a price which represent a ponderate average of the beneficiary delivery price,** from the said month, taking into consideration that the data is certain:

- the initial stock, calculated as a price afferent to the stock from the end of December 2009
- the final stock, calculated as a price afferent the stock from 31.01.2010
- the value of the deliveries, obtained by taken into consideration the prices from the delivery contracts of each beneficiary and the deliver quantities in January 2010

The unitary price afferent to the final stock is calculated according the to the quantitative – valoric proportions. This means it is the maximum between:

- the average trimestrial delivery price (afferent to the reporting period – trimester)
- the average annual delivery price, for the minimization a regularization that coul be to high

In conclusion, even though the Pesteana Mine uses the account no. 348 "Product price differences), it doesn't register the obtained production according to the laws, in the debit of the account number 345 "Final Products", at the standard price[3], fact for which we appreciate that the quality demands are not satisfied.

The standard price needs to be established in anticipation, on the basis of the goods average costs from an anterior period, and it becomes the accounting price. In other words, we use the normal levels of the materials and the consumables, the handwork and the production capacity, level which are being revised according to the conditions existing at that moment.

According to IAS 2 "Stocks", the standard cost is used for the evaluations of the stock ingress and engress during the period because the effective cost is not known. At the end of the production cycle, the effective cost is calculated and the differences to the standard price are registered in the accountancy.

The differences that are established between the standard costs and the production (effective) costs are being directly accounted, and at the end of each administration period, they are grouped in a proportional way to the goods that went out of the stock and to the goods that still are in stock, on the basis of a grouping coefficient, which is determined from the data gathered since the beginning of the year.

According to IAS 2, the stock products and the realized and sold products are registered in the same standard price.

Unlike the presented aspects, at the Pesteana Mine, as in all of SNL Oltenia's subunits, the differences of the monthly costs and thus those for January 2010, are being determined using the following steps:

- we establish "The table of moving the expenses in the internal administration accountancy", which presumes the collection of the expenses in the accounts specific to the administration accountancy;
- we thus obtain the value of the expenses afferent to the obtained merchandise production (the value of the merchandise production at an effective cost)
- the effective price for the realized production is determined like this:

$$Pef = \frac{PMef}{Pf}$$

- we establish the difference between the value of the lignite production at the registration price and the value of the lignite production at the effective costs which can be
  - favorable, when the effective production cost is lower than the registration cost
  - unfavorable, when the effective production cost is higher than the registration cost.

For **the month of January 2010, the Pesteana Mine** has registered the following expenses:

[3] Order of MFP nr 3055 / 2009 for approval of the Accountancy Reglemenations conform with the European Directives, Official Monitor nr 766bis / 2009

A. Expenses for the base activity, Total = 5.694.804,50 lei, from which:
- raw materials = 346.499,17 lei
- fuel = 10.050,56 lei
- power = 1.576.628,05 lei
- merchandise and goods transportation = 109.714,02 lei
- services provided by the ecoonomical agents= 512.376,17 lei
- salaries and other asmiliated rights = 1.919.425,00 lei
- insurance and social protection = 591.995,54 lei

B. Expenses for the auxiliary activity, TOTAL = 1.942.666,39 lei, from which:
- raw materials = 23.578.54 lei
- fuel = 4.509,02 lei
- merchandise and goods transportation = 1070,21 lei
- services provided by the ecoonomical agents= 73.686,33 lei
- salaries and other asmiliated rights = 1.175.037,00 lei
- insurance and social protection = 368.921,00 lei
- other expenses with the living work = 295.864,29 lei

C. General Administration expenses TOTAL = 1.206.381,56 lei, from which:
- raw materials = 20.240,47 lei
- power = 7.785,00 lei
- merchandise and goods transportation= 9.500,00 lei
- services provided by the ecoonomical agents= 19.513,00 lei
- salaries and other asmiliated rights = 453.305,00 lei
- insurance and social protection= 150.746,00 lei
- other expenses with the living work = 545.292,09 lei

D. Selling expenses, TOTAL = 1.186.533,39 lei, from which:

- raw materials = 9.622,83 lei
- fuel = 39.437,02 lei
- power = 273.021,00 lei
- merchandise and goods transportation= 10.859,10 lei
- salaries and other assimilated rights = 517.153,00 lei
- insurance and social protection= 147.877,00 lei
- other expenses for the living work = 188.563,44 lei

The valye of the lignite production, at effective cost, for the month of january is of 7.637.470, 89 lei. Taking into consideration the production value at a registration price (5.21.882,55 lei), it results an unfavorable difference, which imposes the debiting of the accountat no. 348 „Differences in the product prices" with the sum of 816.588,34 lei

At the same time, it is noted that in December 2009, it was registered a favorable difference afferent to the delivered lignite of – 651,969, 40 leis, which imposes for each administration deduction, to be given a unfavorable difference of 131. 910, 44 lei, which is determined after following the specific stages that are presented below:

- we add the value of the stock that existed in 31 12 2009 with the value of the obtained production in januaryt for the registratio price and for the effective price
- thus, we obtain the difference (favorable or unfavorable) between the value of the initial stock and the january production, evaluated at a registration and effective cost. In january, this unfavorable differnce is 263.618, 94 leis, because of the influence of the favorable difference from the beginining of January (651.969,40 lei)
- this differnce is being divided to the lignite quantity represented by the „total initial stock + production" and thus we obtain an A coeffient:

For january 2010, the A coeficient = $\frac{263.618,94}{214.836,74}$ = 1,23 lei/tpm

- the A coefficent is multiplied with the delivered lignit quantity and thus we obtain the difference afferent to the delivery (in red or black)

For january we obtain an unfavorable difference (in black) of 131.910, 54 (1,23 lei/tone * 107.500, 74 tons)

- we are going to determine the value, at the effective delivery price, by substracting this difference from the value of the registration (production) price of delivery.

For January, the delivery value at an effective cost = 6.159.714.43 (6.027.803,89 + 131.910,54). At this last value, we download the lignite administration for the deliveries done in january 2010.

For the accountancy registration, we use the data from the following tabel:

Specification	Quantity - tons -	Production value at effective cost - lei -	Production value at production cost - lei -	Diffences ±
Stock at 31.12.2009	94.837,00	4.793.571,14	5.445.540,54	-651.969,40
Production 01 – 31.01.2010	119.999,74	7.637.470,89	6.721.882,55	915.588,34
Total stock + production	214.836,74	12.431.042,03	12.167.423,09	263.618,94
Deliveries 01 – 31.01.2010	107.500,74	6.159.714,43	6.027.803,89	131.910,54
Stock at 31.01.2010	107.336,00	6.271.327,60	6.139.619,20	131.708,40

Tabel nr. 1 – The lignite production movement afferent to January 2010

We remark, that Pesteana Mine, the proce difference is not alocated according to the prezented normes, the adopted procedure having many flaws.

We consider that in the case in which Pesteana Mine would establish a standard price, according to present laws, and it would determine the price differences at the of the month, through their alocation, on the coeficient basis, over the realised deliveries, would obtain a much realistic financial outcome and without large differences from one month to the other.

4. DIRECTIONS OF MINIMISING THE PRODUCTION COST AFFERENT TO THE LIGNITE EXTRACTION

SNL Oltenia has registered, in the last financial exercises, significant losses in the activity of lignite exploatation, but we consider that it is possible to make production activity rentable, and next we are gonna present you some of the modalities that we have in mind.

A. Raising the lignite production is a first modality, which, in certain conditions, in a relative short time span, improves the financial outcome. This is why, the following actions are being imposed:

- the analysis of the production capacity, of the reserves and the opening works, neccesary fot the creation of new extraction fronts.
- The more careful marketing prospection and the influencing of the potential request, in the sesnse of raising, because, in the last period, the lignite production lowered, and the trend is still lowering.

B. The reabilitation of the mines and modernising the lignite extraction tehnological lines represents another way of reducing the production cost, and because of this we should have in mind the following objectives:

- Modernising the tehnological lines equiped with 1.300 and 1.400 tons excavators
- Modernising the tehnological lines equiped with halding machines (the 6.500, 6.300 and 12.500 mc/h types)
- Reabilitation of the magistral transport lines from the 1.400 – 2.250 mm span.
- Replacing the rubber carpet from the transporting bands with one of higher quality and adapted to the exploatation conditions from the romanian careers.
- Replacing the transporting rollers;
- The reabilitation of the electrical and command instalations
- Modernising the reductor-tambur cupling system from the actioning groups
- Equiping with commanding units

The favorable effects of the lignite mines reabilitation action depends on the way in which the leading machines reabilitation is done: rotor excavators, halding machines and band transporters.

C. Reducing the lignite exploatation expenses

In the respect of realising such ab objectibve, we consider that an important role belongs to the cost tracking system, considering that the actual one is inefficient.

Introducing the method of standard costs in the lignite exploatation could represent a major problem for the management who tryes to fulfill the following objectives:

- adopting a flexible organising strucutre adapted on expenses centres;
- raising the effiency of all the activities and operations developed by the exploatations
- raising the responsibility of all the employees regarding the economical aspects
- Raising the competency of the factors which assure the management of the lignite exploatation and, at the same time, raising their efficiency

D. Raising the productivity of the work in lignite exploatations

Realising a higher volume of production on the time unit or employee is conditioned by a series of factors from which we recall: vein conditions, weather conditions, the grade of productive use of the work time by the staff; professional training; management; the coeficient of using the leading machines; the hourly randament and tehnique performances of every excavation – transporting – halding complex; the quality of the revisions and repairs; the quality of the auxiliary materials used, etc.

E. Raising the professional training and the responsibility of the staff are realised through the following objectives:

- establishing very clearly, through the job description, of the obligations that the staff has
- selecting the staff according to their aptitudes and the level of the base training, at the employment and subsequently, with orgainising professional training courses.
- Training the persional with leading machines tehnical diagnose atributions and learning the neccesary knowledge for this type of operations
- The speciality of the staff
- Raising the comptence and the responsibility towards the executed works
- Promoting an atractive and stimulative system of rewards and recognition.

F. Raising the index of usage the excavation – transport – halding complex.

The actual usage coeficients of the rotor excavator offer high possibilities of raising the production in many ways, like:

- raising the time of machine usage
- eliminating the times when the leading machines are not used in a productive way
- raising the qualities of the maintenance works, revisions and repairs, at the same time with the reductin of their realisation time and the corresponding organisation of repair activity
- reabilitation the instalations of excavation – transport – halding, followed by strictly respecting the new tehnologies and reparations imposed by the supplyers, consultants and antrepeneurs.

5. Conclusions

We consider that in the present work we aproach a present theme which a practical application, because, as it was noted, in the lignite extraction activity, there are loss registered, and is neccesarly, between others, to minimse the production costs.

Thus, from a given level of the sale price, minimising the production cost results in a higher profit, as with raising the sale price, if possible and, presuming that the production cost remains unchanged (even more if it is lowered) also results in a higher profit.

Obtaining the profit depends on lignite extraction units' capacity to obtain an optimal price and to asure the salesment of the realised production at competetive prices.

From these reasons, we consider that using the standard costs, in the extraction of the lignite, represents a solution for the price reduction and control. There are develeoped production budgets which are based on the standards for the materials, the handwork, overhead expenses, etc.

At the same time, the recalled budget inicates the volume of an activity or business and the level of the cost which could be mentained if the proper actions would be taken. The standards are noting the level at which the costs could be reduced. When the costs reach this level, the profit raise will be significant in the units of lignite extraction

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